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A NEW CYCLOPHORID LAND SNAIL FROM THE
WEST INDIES (PROSOBRANCHIA), AND THE
DISCUSSION OF A NEW SUBFAMILY

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Recent collections of land snails from the West Indies have brought to light several new forms. One species of outstanding importance represents a new genus and species of the family Cyclophoridae. Anatomical evidence from this species when compared with others necessitates the taxonomic changes presented below.

I wish to express my gratitude to Dr. Albert Schwartz and Mr. Richard Thomas of Miami, Florida, for collecting and providing the material upon which this paper is based. I am also grateful to Drs. Harold A. Rehder and J. P. E. Morrison of the U. S. National Museum (USNM) for the loan of important comparative material.

The American cyclophorid land snails are in a state of taxonomic confusion. This results from the lack of knowledge about the anatomy of many species and genera, and from the overemphasis of shell and opercular characters for recognizing generic and suprageneric categories.

Tielecke (1940) proposed a system of classification of the cyclophorid mollusks in which he established major categories on the basis of various conchological and anatomical characters, particularly the female reproductive system. His system of classification probably reflects natural relationships, but it ignored nomenclatural priority. He placed the neotropical genera of helicoid cyclophorids in the Family Poteriidae (= Neocyclotinae), and separated them from Old World groups on the basis that the bursa copulatrix is imbedded in the uterine wall and enters the uterus through the oviduct. In other families the bursa copulatrix discharges into the uterus through a separated duct. Tielecke's work was overlooked by most later workers on American cyclophorids. Torre, Bartsch and Morrison (1942) monographed the neotropical species and distributed them among four subfamilies and many genera that were based solely upon conchological characters. They recognized two

subfamilies of helicoid cyclophorids. The Amphicyclotinae contained those species with a chondroid or chitinous operculum, and the Aperostominae consisted of forms with a calcified operculum. Baker (1943: 137) showed that Bartsch and Morrison (*in* Torre, Bartsch and Morrison, 1942: 187) had misapplied the name *Aperostoma* Troschel, 1847, and that their use of the name was superseded by *Neocyclotus* Fischer and Crosse, 1872. Morrison (1955) reviewed the classification of the American species and established a system of suprageneric classification based on the morphology of the male reproductive organ. He relegated opercular characters to generic importance. The Amphicyclotinae of previous authors was raised to familial status (Amphicyclotidae), characterized by the presence of a slender mid-dorsally located verge with a complete tubular vas deferens, and allied to the marine family Lacunidae. He proposed the Amphicyclotidae to include several West Indian genera and the mainland genus *Amphicyclotus* Crosse and Fischer, 1879. The subfamily Neopupinae Kobelt and Moellendorff, 1898, replaced Megalomastominae Torre and Bartsch (*in* Torre, Bartsch and Morrison, 1942: 3). The Neopupinae includes those cyclophorids in which the verge is located on the side of the head and has an open seminal groove extending from the base to the tip. This subfamily consists of West Indian pupinoid genera and the mainland genera *Tomocyclus* Crosse and Fischer, 1872, and *Aperostoma*. The subfamily names Aperostominae of previous authors and Poteriinae Thiele, 1929, were replaced by Neocyclotinae Kobelt and Moellendorff, 1898, which includes those neotropical genera in which the verge is located on the center of the nape, has an open seminal groove extending from the base to the tip, and has a small accessory flagellum.

Solem (1956) reviewed the classification of the Mexican helicoid cyclophorids and made many generic and specific changes. He did not treat suprageneric categories because of the lack of anatomical material, but showed that the Amphicyclotidae as defined by Morrison was nomenclaturally incorrect, for its type-genus had anatomical features that placed it in the Neocyclotinae. Solem's observations were based on *Amphicyclotus palenquensis* (Pilsbry) and *A. texturatus* (Sowerby) (*vide* Tielecke, 1940: 340). I have examined material of *A. parvus* Thompson, *A. megaplanus* Morrison, and *A. ponderosus* (Pfeiffer), all of which support Solem's conclusions regarding *Amphicyclotus*. The reason for Solem's later use of the familial name Poteriidae is not clear (1959: 180). Its use for the same group is predated by thirty years by the name Neocyclotinae.

The Amphicyclotidae as defined by Morrison (1955: 160-162) is known to include *Crocidopoma* Shuttleworth, 1857, *Amphicyclotulus* Kobelt, 1912, *Cyclohaitia* Bartsch, 1942, *Cycloblandia* Bartsch, 1942, and *Lithacaspis* new genus. This group is characterized by the presence of a long, slender verge located on the center of the nape and has an enclosed tubular vas deferens. As in the Neocyclotinae, the bursa

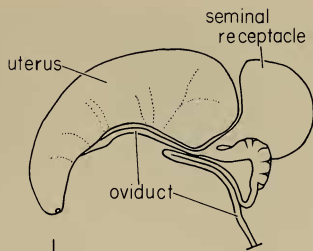


FIG. 1. *Cycloblandia b. beauianus* (Petit). Gross morphology of female genital system exclusive of ovaries.

copulatrix is imbedded in the uterine wall and discharges through the oviduct (Fig. 1). The group apparently is confined to the West Indies and is a natural assemblage. I agree with Solem (1956: 42) that the characters used by Morrison were overemphasized, but the group does merit subfamilial recognition. Since *Amphicyclotus* anatomically does not belong in this group a name change is necessary. This group should be known as **Crocidopominae** new subfamily. Type-genus: *Crocidopoma* Shuttleworth, 1857.

The Crocidopominae is most closely related to the Neocyclotinae because of the structure of the bursa copulatrix. It consists of a lineally distributed series of genera extending from eastern Cuba east and south through Hispaniola, Puerto Rico and the Lesser Antilles to St. Lucia Island. Three of these genera, *Crocidopoma* (and its questionably distinct subgenus *Cyclocubana* Torre and Bartsch, 1942), *Cyclohaitia* and *Amphicyclotulus*, are alike in possessing raised spiral chords or threads on the shell. They differ by opercular characters. *Amphicyclotulus* has a simple, flat, chondroid operculum, *Cyclohaitia* has a chondroid operculum with an expanded, fimbriated outer edge, and *Crocidopoma* has a raised spiral lamella on the chondroid basal plate, which is filled in with a thick calcareous deposit. *Cycloblandia* and *Lithacaspis* are alike in having only fine, incremental striations on the shell. They differ from each other by opercular characters. *Cycloblandia* has a simple, flat, chondroid operculum, as does *Amphicyclotulus* to which it is subgenerically allied. *Lithacaspis* has a raised spiral lamella that is filled in with and partially covered by a thick calcareous deposit. It should be emphasized that the differences between these genera are not very striking, and further collecting in the West Indies may reveal intermediate series of species.

Lithacaspis new genus

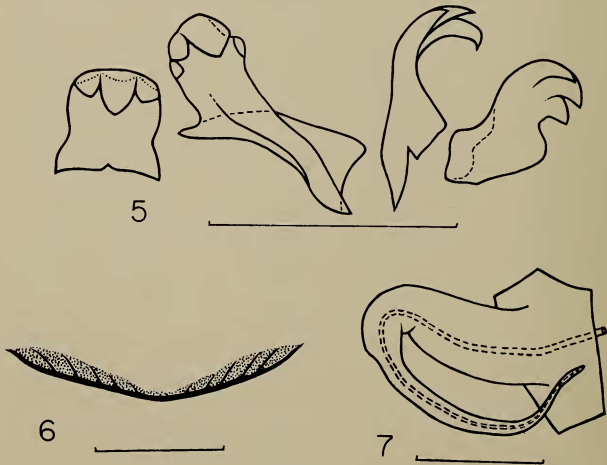
Shell small; helicoid; unicolored, grayish-yellow. Aperture circular, simple, without siphonal notch. Peristome simple, sharp. Umbilicus



FIGS. 2-4. *Lithacaspis xanthoglauca* new species, holotype, UMMZ 216551.

wide, about $\frac{1}{5}$ - $\frac{1}{4}$ major diameter. Sculpture of embryonic whorls consisting of very fine dense granules. Sculpture of postembryonic whorls consisting of fine, irregular incremental striations. Operculum (Fig. 6) calcified; basal chondroid plate with raised, oblique spiral lamella; interspaces of lamella filled in with thick calcareous deposit that tends to cover and obscure lamella; nucleus of operculum generally barren or with very thin calcareous deposit.

The verge (Fig. 7) is about 2 mm long and is located on the center of the nape at a distance behind the tentacles about equal to the



FIGS. 5-7. *Lithacaspis xanthoglauca* new species. 5, radular teeth, scale equals 50 microns; 6, diagrammatic cross-section of operculum, thickness of calcareous deposit (stippled) slightly exaggerated, scale equals 1 mm; 7, verge, scale equals 1 mm.

snout length. When contracted, the verge is U-shaped, and is folded posteriorly under the mantle with the distal end pointing forward and lying to the right of the base. The basal half of the verge is relatively stocky; beyond this point the distal half becomes constricted and very slender. The vas deferens is simple, tubular, completely enclosed within the verge, and terminates at the tip.

The single complete radula examined is 3.69 mm long, and has 44 transverse rows of teeth. The cusp formula is 3-4-3-3 (Fig. 5).

Type-species: Lithacaspis xanthoglauca new species.

Etymology: The generic epithet is derived from the Greek λιθακος, meaning stony, and ασπις, meaning little shield, and alludes to the heavily calcified operculum. The name is of the feminine gender. The genus at present is monotypic and is known only from St. Lucia Island.

Lithacaspis xanthoglauca new species

Description: Shell (Figs. 2-4) very small. Depressed helicoid, 0.70-0.77 times as high as wide. Shiny; covered with a light yellowish gray periostracum. 4.0-4.1 whorls at maturity; periphery, base and shoulders evenly rounded. 1.8 raised, rounded embryonic whorls; first whorl 0.6-0.7 mm in diameter; remaining whorls regularly increasing in size; minor diameter of shell 0.71-0.74 times major diameter. Suture deeply impressed. Aperture circular; slightly oblique; complete; hyaline, showing color of periostracum; width of aperture 0.45-0.47 times major diameter. Umbilicus deep, showing all previous whorls; 0.19-0.28 times major diameter. Embryonic whorls sculptured with very minute, dense granules. Postembryonic whorls with very fine, irregular incremental striations that extend from suture to umbilicus, where they become a little stronger and more distinct; striations also a little more intense near suture. Sexual dimorphism not apparent.

Operculum consisting of about five whorls. Basal plate with thin spiral lamella projecting obliquely outward. Interspaces between spiral lamella with thick calcareous deposit that usually is continuous over lamella. Outer edge of chitinous basal plate not fimbriated.

Measurements of holotype: height, 5.1 mm; major diameter, 7.3 mm; minor diameter, 5.4 mm; aperture width, 3.4 mm; umbilicus, 1.4 mm; 4.0 whorls.

Measurements of paratypes: height, 4.8-5.8 mm; major diameter, 6.2-8.3 mm; aperture width, 2.9-3.7 mm; umbilicus, 1.1-2.3 mm.

Type-locality. 1.7 mi. N Forestiere, Castries Quarter, St. Lucia Island, West Indies.

Types: Holotype: University of Michigan, Museum of Zoology (UMMZ) 216551 (male); collected 31 March 1963 by Albert Schwartz. Paratypes: UMMZ 216552 (4), USNM 668735 (2); same data as the holotype.

Lithacaspis xanthoglauca is similar in shell characters to *Cycloblandia beauianus* (Petit) from Guadalupe, which is the only species that it

closely resembles. Besides the opercular differences discussed above, it differs from *C. beauianus* by being lighter in color, being smaller, having fewer whorls, and by having finer axial sculpture. *C. beauianus* has a yellowish brown periostracum, is 10.5–11.3 mm in major diameter, 6.9–7.8 mm high, and has 4.4–4.6 whorls.

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